

STATE OF IDAHO DEPARTMENT OF FISH AND GAME

Ross Leonard, Director

MIDDLE SNAKE RIVER FISHERIES STUDIES 1958 - 1960

Summary of Downstream Migrant Chinook Salmon and Steelhead Trout
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January, 1961

SUMMARY OF DOWNSTREAM MIGRANT
CHINOOK SALMON AND STEELHEAD TROUT
TRAPPING AT WILDHORSE RIVER WEIR,
JANUARY 1, 1958 TO JUNE 30, 1960

Introduction

The downstream migrant trapping weir on the Wildhorse River was placed in operation on January 1, 1958 and was operated daily until June 30, 1960. The project was financed by the Idaho Power Company under terms of an order issued by the Federal Power Commission under Article 35 of the license to construct dams on the Middle Snake River. The weir was designed to handle 300 c.f.e. of the Wildhorse River and flows exceeding this amount were bypassed around the old river channel. No other provisions were made to handle the runs of spring chinook salmon and steelhead trout that utilized the Wildhorse drainage. Wildhorse River enters the Snake River between Brownlee and Oxbow Dams.

All salmon and steelhead downstream migrants were marked by clipping both ventral, fins, transported by tank truck and released in Pine Creek, a tributary of the Weiser River.

Findings and Discussion

A total of 20,477 steelhead trout downstream migrants and 4,975 chinook salmon downstream migrants were trapped and transferred from the Wildhorse

River Weir during the two and a half years of its operation as shown in Table I.. An estimated 35,908 steelhead downstream migrants and 6,004 steelhead downstream migrants passed down the river during the project. Approximately 57 per cent of the steelhead downstream migrants and 82.9 per cent of the chinook downstream migrants that passed down the Wildhorse River during this period were trapped. A larger percentage of chinook downstream migrants were trapped as most of these fish migrated prior to the spring runoffs and in November of 1958 and 1959. The heaviest steelhead catches were usually made during the periods of greatest flows when only a portion of the river could be strained by the weir.

Recommendations

It is recommended that a close watch of sport-caught salmon and steelhead be made in 1961 and 1962 in the Weiser River drainage and the middle Snake River for marked fish. Salmon and steelhead caught at the Oxbow trap and handled for any reason should also be examined for pelvic fin clips.

It is also recommended that plantings of hatchery rainbow trout be made to replace juvenile steelhead lost to the sport fishery of the Wildhorse River drainage, the size and numbers to be determined by the Fisheries Management Division of the Idaho Fish and Game Department. Costs of such a program should be borne by the Idaho Power Company.

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Table 1. Catches of and estimated totals of chinook salmon and steelhead trout downstream migrants at Wildhorse River weir, January 1, 1958 - June 30, 1960.

Month	Chinook Salmon Caught			Steelhead Trout Caught			Est. Total Chinook Salmon Migrants			Est. Total Steelhead Migrants		
	'58	'59	'60	'58	'59	'60	'58	'59	'60	'58	'59	'60
January	502	203	15	54	301	13	502	213	15	54	327	13
February	386	80	48	256	42	27	523	80	48	442	42	27
March	957	837	138	622	369	213	1,252	885	220	835	396	688
April	159	188	52	867	1,350	971	330	275	179	1,948	1,964	3,129
May	10	35	7	1,918	2,912	1,599	39	55	21	7,633	4,238	4,594
June	8	14	0	155	715	59	13	18	0	444	953	147
July	18	2		3	37		18	2		3	37	
August	6	1		11	37		6	1		11	37	
September	21	0		228	799		21	0		228	799	
October	28	77		1,257	1,926		28	77		1,257	1,926	
November	117	482		3,057	212		117	482		3,057	212	
December	516	68		425	42		516	68		425	42	
Sub-Totals	2,728	1,987	260	8,853	8,742	2,882	3,365	2,156	483	16,337	10,973	8,598
TOTALS	4,975			20,477			6,004			35,908		

Table 2. Actual catches and estimated totals of chinook salmon and steelhead trout downstream migrants at Wildhorse River weir, January 1 - June 30, 1960.

Month	Percent of River Strained	Total Chinook Catch	Total Steelhead Catch	Est. Total Chinook Catch	Est. Total Steelhead Catch
Jan. 1-31	100	15	13	15	13
Feb. 1-28	100	48	27	48	27
29	60	0	0	0	0
Mar. 1-20	100	110	25	110	25
21	95	0	1	0	1
22	75	0	6	0	8
23-27	55	1	32	2	58
28-31	25	27	149	108	596
		138	213	220	688
Apr. 1-3	25	17	58	68	232
4-12	20	8	231	40	1,155
13-16	35	8	104	23	297
17-30	40	19	578	48	1,445
		52	971	179	3,129
May 1-3	40	0	271	0	678
4-5	35	1	130	3	371
6-9	30	0	327	0	1,090
10-11	35	2	263	6	751
12-18	30	2	239	7	797
19-24	40	2	258	5	645
25	50	0	65	0	130
26-31	35	0	46	0	132
		7	1,599	21	4,594
June 1-6	35	0	13	0	37
7-18	40	0	30	0	75
19-24	45	0	13	0	29
25-30	50	0	3	0	6
		0	59	0	147
Grand Totals		260	2,882	483	8,598

CATCHES OF DOWNSTREAM MIGRATING
CHINOOK SALMON AND STEELHEAD TROUT
IN BARGE TRAPS BELOW BROWNLEE DAM
FROM JANUARY 1, 1960 to AUGUST 23, 1960

The continued operation of the three downstream migrant trapping barges below Brownlee Dam was considered necessary during 1960 due to changes in the construction of the barrier net in the forebay and the extensive repairs made on the net in 1960. Trapping operations were terminated on August 23, 1960.

The methods of operating the traps as well as the assumptions used in deriving estimates of the total numbers of migrants passing the trapping site were described in an earlier report (Bell, 1960) under the same title, but covering 1959 catches. As in 1959, the barge traps were checked once each day.

An estimated 77,510 chinook salmon downstream migrants and 15,249 steelhead downstream migrants passed the trapping site from January 1 to August 23, 1960 for a combined total of 92,759 as shown in Table 1. It is computed that 43.6 percent or 40,414 chinook and steelhead downstream migrants of the estimated total of 92,759, passed the trapping site alive.

Largest numbers of downstream migrating salmon and steelhead passed the trapping site during April, 1960, when an estimated 26,399 migrants passed through. Other months when large numbers passed through were August (1-23), June, May and March with 14,775, 14,527, 111,328 and 9,284 downstream migrants respectively. Catches of downstream migrants were relatively light in January, July and February and the respective estimated totals of downstream migrants passing the trapping site were 6,272, 4,743 and 2,341.

Fork-length frequencies of chinook salmon downstream migrants by month is shown in Table 1. Table 2 shows the fork-length frequency of steelhead down-stream migrants caught during 1960.

It was again obvious from the small size of some chinook migrants caught in April, 1960 - as in April and May of 1959 - that some of the fry were offspring of fish that had spawned between Brownlee Dam and the trapping site the previous winter.

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Table 1. Estimated daily and monthly totals of chinook salmon and steelhead trout downstream migrants passing trapping area below Brownlee Dam, January 1, 1960 to August 23, 1960.

	January		February		March		April		May		June		July		August	
	Chin.	Steel.	Chin.	Steel.	Chin.	Steel.	Chin.	Steel.	Chin.	Steel.	Chin.	Steel.	Chin.	Steel.	Chin.	Steel.
1			124				1,890	90	108	54	86				450	45
2							412	206	50		86				828	
3	248						927	412							1,170	
4							776	97	49		512					
5			882				194				384	128	46		2,782	214
6	260		142				213		415		120				1,442	206
7			145				136	204	328		336	112			756	216
8	123						132	198	279		354				592	74
9							61	183	380	380	2,235	149			792	
10	126						56		672	96	1,260				707	
11	122						364		485	291	1,026				194	97
12								721	208	208	342				534	
13							324	756	424		428				546	
14							1,484	1,484	480		105				1,152	
15	264						1,060	1,696	158		291				183	61
16	128		268	134			214	428	158		351				156	
17			306				420	420	416		4,428		44		712	178
18	130		276				309	206	840		972				364	
19							636	1,272	1,248	104			36	36	78	156
20	680						728	416	936	312	338		50			90
21	1,282				127		408		624	208	90		63			
22	1,500		154		250		376	188	1,248	312			204			
23	441				1,360		156	390	520	208			464			
24	750				675		335	67	375		185		342			
25	111				1,860		1,472						858			
26					1,050	175	1,564	68	740		79		410	82		
27	107				680		264	66	75	225	130		544			
28					720	288	1,250		450				518			
29					781	142	372	62	124				318			
30					144		177	59					294			
31					860	172			140				434			
Totals	6,272		2,297	134	8,507	777	16,303	10,096	11,930	2,398	14,138	389	4,625	118	13,438	1,337

Barges Not Operating
23 - 31

Barges Not Operating
23 - 31

Table 2. Fork-length frequency of 775 chinook salmon downstream migrants caught from January 3, 1960 to August 19, 1960 on downstream migrant trapping barges below Brownlee Dam.

Length in mm.	Jan.	Feb.	March	April	May	June	July	Aug.
30-34				2				
35-39				21				
40-44				3				
45-49				5				
50-54				3				
55-59					1			
60-64					2			
65-69					2			
70-74					5			
75-79				1	5			
80-84			1		9			
85-89					19	1		
90-94			2		12	1		
95-99			1	3	9	4	1	
100-104			2	2	6	23		
105-109			2	3	1	29		
110-114			3	12	3	28		
115-119			3	1	1	20	1	
120-124				6	6	7	1	1
125-129					2	3	2	3
130-134	5			5	5	2	13	18
135-139				1	1	1	10	63
140-144				1	4	1	3	39
145-149				1	1		6	10
150-154	2	1		1			11	9
155-159	1				1		4	2
160-164					1		4	2
165-169	1						2	
170-174	3		1	2				
175-179	6				1			
180-184	10	3	4	7	3		1	
185-189	6	3	6	15	6			
190-194	5	2	13	27	6		1	
195-199	4	3	9	28	5			
200-204	1	1	6	29	5			2
205-209	1	2	2	10	5			
210-214		1		6	1			
215-219				1	1			
220-224			1	4				
\bar{x} =	177.7	190.0	170.9	155.04	122.9	110.01	143.8	140.1
n =	45	16	56	200	129	120	60	149

Table 3. Fork-length frequency of 157 steelhead trout downstream migrants caught from February 16, 1960 to August 20, 1960 on downstream migrant trapping barges below Brownlee Dam.

Length in mm.	Jan.	Feb.	March	April	May	June	July	Aug.
70-74				2				
75-79				2				
80-84				1				
85-89				1				
90-94								
95-99				1				
100-104				1				
105-109			1					
110-114				5	2			
115-119				6				
120-124				5				
125-129		1		1				
130-134				14				
135-139				10				
140-144				13				
145-149			1	9	1			
150-154				5	2			
155-159				5	2			
160-164				4	3			
165-169			2	4	2			
170-174				1	2			
175-179				2	4			
180-184					1	1		
185-189				1	2			
190-194				1	2	1		
195-199				2				
200-204								
205-209				1	2			1
210-214			1					2
215-219								
220-224								1
225-229				2				
230-234				1		1		2
235-239			1					1
240-244								5
245-249				1				
250-254							1	
255-259								
260-264								1
265-269								
270-274				1				
275-279				1				
280-284				1				1
285-289								
290-294			1				1	
295-299								
300-304								1
\bar{x} =		225	189.3	145.14	168.4	202.6	271.5	239.6
n =	0	1	7	104	25	3	2	15

OBSERVATIONS OF PREDATION ON SALMON AND STEELHEAD MIGRANTS
IN BROWNLEE RESERVOIR, 1959-60

Totals of 82 largemouth bass, ranging in fork length from 6 to 13 inches; 89 smallmouth bass, ranging in fork length from 3 to 15 inches; 17 black crappie, 8 bluegills, and 20 squawfish, all of which were taken on sport fishing gear during 1959, were examined for evidence of predation on salmon and steelhead. No such evidence was found.

Examination was made of the stomachs of 42 of the larger bass caught by hook and line in the summer of 1960 for evidence of predation on salmon and steelhead downstream migrants. Remains of a salmon or steelhead were found in the stomachs of each of 8 bass - 2 of the 17 largemouth examined and 6 of the 25 smallmouth. It appeared that smallmouth were a somewhat more serious predator than the largemouth but that neither species was too serious a predator during the months when downstream migration would normally occur.

Stomachs of

22 hook-and-line-caught squawfish were examined in 1960 and one salmon downstream migrant was found. The majority of the squawfish stomachs were empty upon examination.

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GENERAL OBSERVATIONS OF SPAWNING OF LARGEMOUTH AND SMALLMOUTH BASS IN BROWNLEE, RESERVOIR DURING SPRING AND SUMMER 1959 AND 1960

Observations were made during 1959 and 1960 of the spawning of largemouth and smallmouth bass during the spring and summer months in relation to the project operation at Brownlee Dam. Most of the spawning activity observed took place between June 7 and June 18 in both 1959 and 1960 with the water temperature between 65 and 73° F. As shown in Figure 1 and Table 1, the reservoir was either rising or relatively stable throughout the entire spawning season so any destruction to eggs due to reservoir operation should have been minimal.

The first schools of bass fry were observed in the reservoir on June 10 of 1959 and June 12 of 1960. Bass fry were seen as late as June 22 in 1959 and June 28 in 1960.

Since bass spawning will normally occur when water is being stored in the reservoir, except possibly under some unusual conditions, future reproduction of both species of bass in the reservoir should be very good.

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TEMPERATURE STUDIES OF BROWNLEE RESERVOIR

Temperature readings were taken at five-foot intervals with a thermocouple from a depth of 165 feet to the surface during the summers of 1959 and 1960. Readings were always taken at the same location - a spot approximately one mile above the mouth of the Powder River. Wind would cause the boat to drift, therefore, accurate readings could be taken only on days of little or no wind. As a result, weekly readings could not always be obtained as desired.

Although thermal stratification of reservoir waters occurred both years, as shown in Table 2 and Figures 2 and 3, formation of a thermocline was not indicated.

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Table 1--Daily surface temperatures of Brownlee Reservoir in °F. and daily elevations of Brownlee Reservoir from March 1, 1959, to June 30, 1959, and from March 1, 1960, to June 30, 1960.

	March				April				May				June			
	1959		1960		1959		1960		1959		1960		1959		1960	
	Elev.*	Temp.	Elev.	Temp.	Elev.	Temp.	Elev.	Temp.	Elev.	Temp.	Elev.	Temp.	Elev.	Temp.	Elev.	Temp.
1	32.9	40	25.4	35	19.4	46	41.6	48	21.7	53	70.0	58	65.4	64	74.5	64
2	32.7	40	23.8	35	19.1	46	42.6	45	23.4	54	70.3	58	66.4	64	74.2	64
3	32.6	40	22.4	38	18.8	46	43.9	45	26.0	54	70.6	55	67.5	65	75.3	65
4	33.1	41	21.2	38	19.0	46	46.9	58	28.7	55	71.2	54	68.7	66	75.5	65
5	33.5	41	20.0	38	19.3	47	47.3	59	30.6	55	74.8	54	69.8	62	75.8	68
6	32.4	40	18.8	38	19.5	50	48.9	59	32.4	55	71.7	55	70.1	68	76.1	68
7	32.6	41	18.1	38	20.0	50	51.0	59	34.4	58	71.7	55	70.2	68	76.2	65
8	32.5	41	18.3	40	20.3	50	53.7	59	36.0	58	71.3	55	70.0	66	76.7	65
9	32.3	42	20.4	38	20.2	48	57.0	56	37.2	56	71.5	56	69.9	69	76.5	69
10	32.2	41	22.3	38	20.6	48	60.9	59	38.9	58	71.6	56	69.7	65.5	76.5	69
11	32.1	40	22.6	39	19.9	49	63.9	51	40.8	58	71.7	64	70.1	67	76.4	69.5
12	32.1	41	22.0	40	19.1	49	65.6	52	41.7	58	71.7	63	71.8	69	76.2	70
13	32.0	42	22.3	40	18.6	52	67.1	54	42.3	59	72.0	62	72.7	71	76.1	71
14	32.1	41	22.2	40	18.0	52	68.3	52	42.7	58	72.3	63	73.5	71	76.0	71
15	32.2	41	21.7	40	18.0	52	69.3	52	43.3	57	72.7	63	74.3	70	76.0	70
16	32.8	43	22.9	40	17.8	53	69.9	52	44.8	59	73.2	63	75.0	68	76.0	71
17	32.3	43	20.9	40	17.5	53	70.0	52	47.0	58	73.5	60	75.5	69	76.0	70
18	32.1	43	20.8	40	17.3	52	70.0	55	49.1	58	73.7	60	75.7	69	76.0	70
19	31.1	43	21.0	40	17.5	52	70.0	55	50.7	58	73.7	60	75.7	70	76.5	68
20	29.9	43	22.5	40	18.5	52	69.9	55	52.1	59	73.8	60	75.7	71	77.0	69
21	28.7	43	24.6	43	18.5	52	69.8	56	53.4	59	73.8	60	76.0	71	76.95	69
22	27.7	43	26.7	43	18.3	52	69.7	54	54.2	59	73.7	60	77.0	75	76.94	70
23	26.5	43	29.1	43	18.0	54	69.7	55	54.5	59	74.1	60	77.0	75	76.7	70
24	25.3	44	31.8	48	18.0	54	69.7	55	55.1	59	74.3	59.6	76.4	75.6	76.4	70.8
25	24.4	44	34.3	50	17.8	54	69.7	55	55.8	59	74.3	59	77.0	74	75.8	70.8
26	23.1	44	36.4	48	18.1	54	69.8	54	56.9	59	74.3	59	77.0	74	75.4	71
27	22.5	44	38.4	49	18.8	53	69.7	53	58.3	59	74.3	60	76.9	74	75.4	71
28	22.0	44	41.1	48	19.3	53	69.8	58	59.6	59	74.3	60	76.6	74	74.9	72
29	21.2	44	42.6	45	20.1	54	69.8	57	60.9	60	74.1	60	76.1	74	74.3	72
30	20.4	44	43.9	49	20.8	54	70.0	58	62.2	61	74.0	64	76.0	70.6	73.8	72
31	19.7	43	45.0	48					63.8	61	74.1	64				

*Plus 2000' m.s.l.

Table 2--Water temperature readings taken at 5-foot intervals in Brownlee Reservoir during spring and summer months of 1959 and 1960 at a set location one mile above the mouth of the Powder River.

Date Depth ft.	1959										1960				
	5-22	5-29	6-11	6-18	6-22	7-8	7-15	7-24	7-28	8-4	6-5	6-21	7-6	7-15	8-9
Surface	66	64.5	74	73	71.5	72.5	75.5	80	75	76	69.5	70.5	73	77	73.5
5	60.5	61	69	67	70	70	72.5	75	74.5	74.5	65.5	68.5	72	74.5	73
10	60.5	61	67.5	66.5	69	69.5	70.5	74.5	74	74	65	68	71.5	73.5	73
15	60	61	66	66	68.5	69	70	74.5	74	74	64.5	67.5	71	73	73
20	60	60.5	65.5	66	67.5	69	70	74.5	73.5	74	64	67.5	71	73	73
25	60	60.5	65.5	66	67.5	69	69.5	74	72.5	74	63	67.5	71	72.5	73
30	60	60.5	65.5	65.5	67.5	69	69.5	73.5	72.5	74	62.5	67.5	71	72.5	73
35	59	60	65	65	67.5	69	69.5	73.5	72	74	62.5	67.5	71	72.5	73
40	58.5	60	65	65	67	69	69	72.5	71.5	74	61.5	67.5	70.5	71.5	73
45	58.5	60	64.5	64.5	67	69	69	72	71.5	73.5	59.5	67.5	70.5	71	73
50	58	60	64	64	66.5	69	69	71.5	71	73.5	59	66	70.5	71	73
55	57.5	59.5	63.5	64	66	68.5	69	70.5	70.5	73	59	65.5	70.5	70.5	73
60	57	59.5	62.5	63.5	65.5	67.5	69	70.5	70	73	58	65.5	70.5	70	72.5
65	57	59	62	63	65.5	67.5	68.5	70	70	73	57.5	65	70	70	72.5
70	56.5	58	61.5	62.5	64	67.5	68.5	69	69.5	72.5	57.5	64	70	69.5	72.5
75	56	58	61	62	63	67	68.5	69	69.5	72	57	63.5	70	69.5	72.5
80	55.5	57.5	61	61	62.5	67	68.5	69	69	71	56.5	63	69.5	69	72.5
85	55.5	57.5	60.5	60.5	61.5	66.5	68	69	69	71	56	62	69	68.5	72.5
90	55	57	60	60	60.5	66	67.5	69	68	69.5	56.5	61.5	69	68	72.5
95	55	56.5	59	58.5	59.5	64.5	67	68.5	68	69	56	59.5	68.5	67	72.5
100	54.5	56	59	58	58.5	64	66.5	68	67.5	69	55	58.5	68	65.5	71.5
105	54	56	58	57.5	58	62.5	65.5	67	66.5	68.5	55	58	67	64	71
110	53	55.5	57.5	57	58	62	64.5	66	65.5	68	55	57	66	62.5	71
115	52	55	56.5	56.5	58	60.5	62.5	65	64	66.5	54.5	57	65	60	69.5
120	51.5	54.5	56	56	57.5	59.5	61.5	64	63	65	54	56.5	63.5	59	68.5
125	51.5	54	56	55.5	55.5	58	60.5	63	61.5	64	54	56	60	57.5	67
130	51	53	55.5	55	56	57	59.5	62	59.5	62	54	56	59	56.5	66
135	51	52.5	55.5	54	55.5	56	58.5	61	59	60.5	53	55.5	57.5	55.5	62.5
140	50.5	51.5	54.5	53.5	54.5	54.5	57.5	59.5	58	58.5	52.5	55	57	54.5	59.5
145	46	51.5	54	53	54	53.5	56.5	58	56.5	57	51.5	54.5	56.5	53.5	58
150	45.5	51	53	52.5	53	52.5	55	56.5	56	55.5	51	54	55.5	51.5	55.5
155	45	50	52	52	52.5	52	54	55.5	54	54	48.5	53.5	55	48.5	51.5
160	43.5	49.5	51.5	51	51.5	51.5	53.5	54	53.5	53.5	45.5	51.5	54	46	51.5
165	43	49	51.5	50.5	51.5	51.5	53	53.5	52.5	52	45	49	52	44.5	45.5

Figure 1. Daily surface temperatures of Brownlee Reservoir in °F and daily elevation of Brownlee Reservoir from March 1, 1959 to June 30, 1959 and from March 1, 1960 to June 30, 1960.

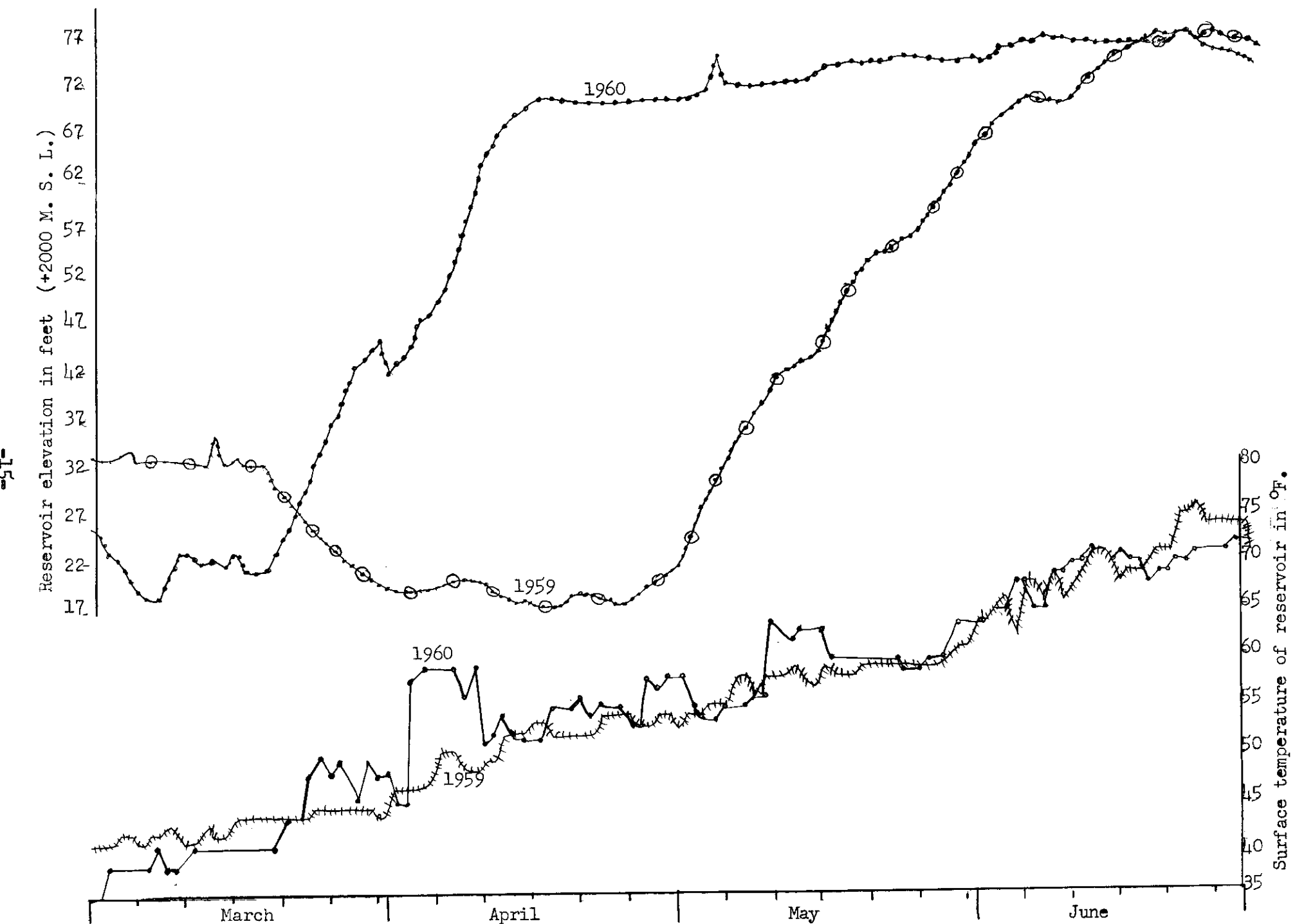


Figure 2. Temperature of Brownlee Reservoir in °F at a point 1 mile above mouth of Powder River
May - August, 1959

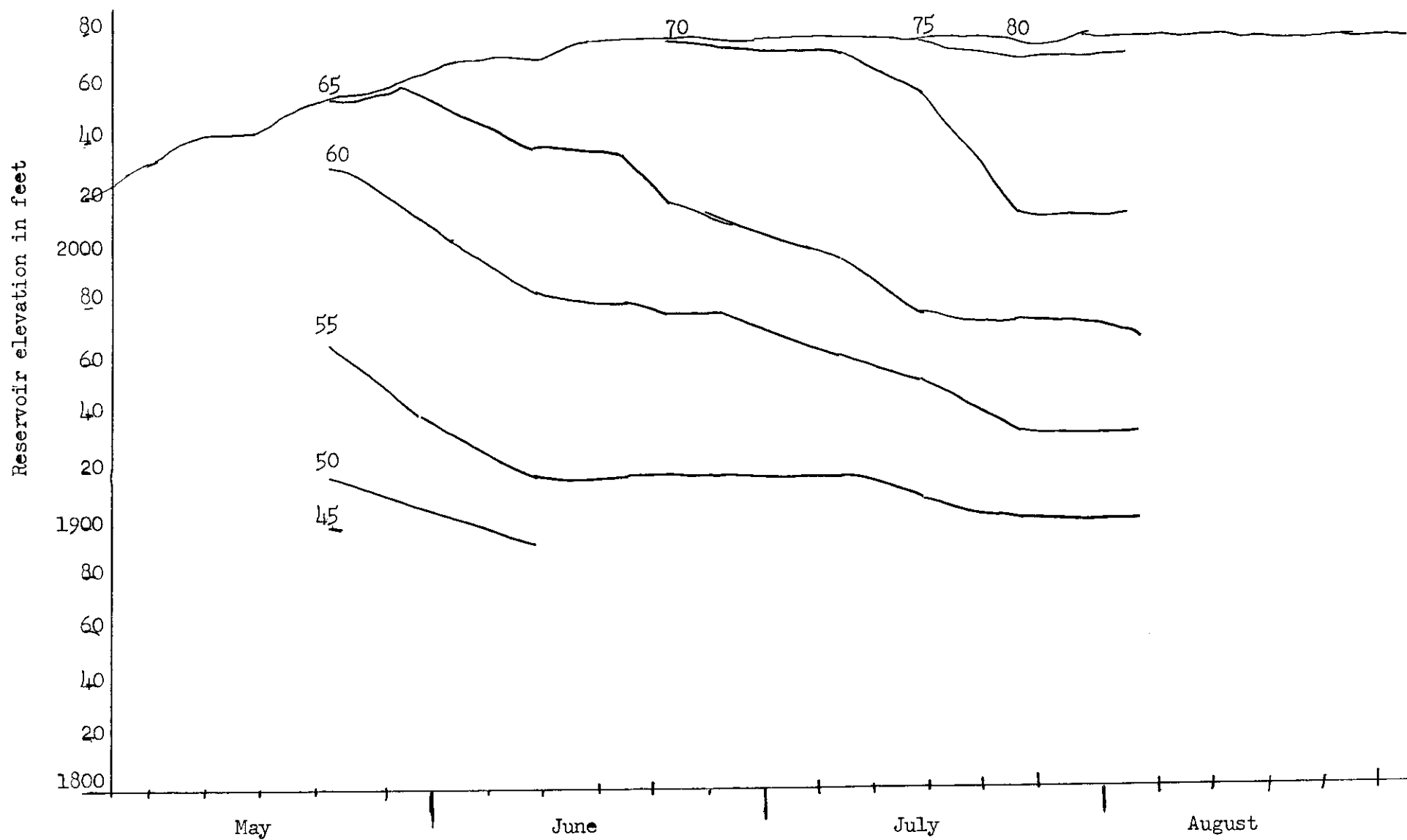


Figure 3. Temperature of Brownlee Reservoir at a point 1 mile above mouth of Powder River
May - August, 1960.

